

WHAT IS CLAIMED IS:

1. A chemical liquid injector for injecting a liquid from a liquid syringe including a cylinder member and a piston member slidably inserted into the cylinder member into a patient through an extension tube in test injection and then injecting the liquid in normal injection, comprising:

a cylinder holding mechanism for removably holding the cylinder member of the liquid syringe;

a piston driving mechanism for sliding the piston member of the held liquid syringe;

a computer unit for controlling the operation of the piston driving mechanism;

a main display panel for displaying various data as output from the computer unit;

a main operation panel for accepting an input action of the various data to the computer unit;

a sub display panel for displaying various data as output from the computer unit, the sub display panel being smaller than the main display panel;

a sub operation panel for accepting an input action of the various data to the computer unit, the sub operation panel being smaller than the main operation panel;

an injection control unit equipped with at least the computer unit, the main display panel, and the main operation panel; and

an injection head formed as a separate body from the injection control unit and equipped with at least the cylinder holding mechanism, the piston driving mechanism, the sub display panel, and the sub operation panel,

wherein various data for the normal injection is input on the main operation panel and displayed on the main display panel, and

various data for the test injection is input on the sub operation panel and displayed on the sub display panel.

2. A chemical liquid injector according to claim 1, wherein control data for the piston driving mechanism dedicated to checking of the connection of the extension tube is stored in the computer unit as the various data for the test injection,

the sub operation panel accepts an input action of an instruction to start the test injection, and

the computer unit controls the operation of the piston driving mechanism in accordance with the control data in response to the input action of the instruction to start the test injection.

3. A chemical liquid injector according to claim 2, further comprising a pressure detecting element for detecting a pressure of the liquid injected into the patient,

wherein the sub display panel displays the pressure detected during the test injection in real time as the various data for the test injection.

4. A chemical liquid injector according to claim 3, wherein the computer unit produces data of a graph over time from the pressure detected during the test injection in real time, and

the sub display panel displays the graph over time as the various data for the test injection in real time.

5. A chemical liquid injector according to claim 3 or 4, wherein the computer unit detects occurrence of an error when the pressure detected during the test injection goes out of a predetermined permissible range, and

the sub display panel displays the detected occurrence of error.

6. A chemical liquid injector according to claim 3, wherein the computer unit detects occurrence of an error when the graph over time produced in real time during the test injection goes out of a predetermined range graph corresponding to a permissible range of the pressure changing over time in the test injection, and

the sub display panel displays the detected occurrence of error.

7. A chemical liquid injector according to any one of claims 3 to 6, wherein the main display panel displays the pressure detected during the normal injection in real time as the various data for the normal injection.

8. A chemical liquid injector according to claim 7, wherein the computer unit produces data of a graph over time from the pressure detected during the normal injection in real time, and

the main display panel displays the graph over time as the various data for the normal injection in real time.

9. A chemical liquid injector according to claim 7 or 8, wherein the computer unit detects occurrence of an error when the pressure detected during the normal injection goes out of a predetermined permissible range, and

the main display panel displays the detected occurrence of error.

10. A chemical liquid injector according to claim 8, wherein the computer unit detects occurrence of an error when the graph over time produced in real time during the normal injection goes out of a predetermined range graph corresponding to a permissible range of the pressure changing over time in the normal injection, and

the main display panel displays the detected occurrence of error.

11. A chemical liquid injector according to any one of claims 3 to 10, wherein the pressure detecting element detects a force acting on the piston driving mechanism fixed to the injection head and pressing the piston member.

12. A chemical liquid injector according to any one of claims 1 to 11, wherein the liquid syringe includes a contrast media syringe for injecting a contrast media as the liquid into the patient whose image is taken by an imaging diagnostic apparatus and a physiological saline syringe for injecting physiological saline as the liquid into the patient,

the contrast media syringe and the physiological saline syringe are connected to a blood vessel of the patient through a bifurcated extension tube,

the cylinder holding mechanism comprises a pair of mechanism for individually holding the cylinder members of the contrast media syringe and the physiological saline syringe,

the cylinder holding mechanism comprises a pair of mechanism for individually sliding the piston members of the contrast media syringe and the physiological saline syringe,

the computer unit individually controls the operations of the pair of piston driving mechanisms,

the main operation panel accepts an input action of various data for normal injection of the contrast media and the physiological saline,

the main display panel displays the various data for normal injection of the contrast media and the physiological saline,

the sub display panel displays various data for test injection of the physiological saline, and

the sub operation panel accepts an input action of the various data for test injection of the physiological saline.

13. A chemical liquid injector according to any one of claims 1 to 11, wherein the liquid syringe includes a contrast media syringe for injecting a contrast media as the liquid into the patient whose image is taken by an imaging diagnostic apparatus and a physiological saline syringe for injecting physiological saline as the liquid into the patient,

the cylinder holding mechanism comprises a pair of mechanism for individually holding the cylinder members of the contrast media syringe and the physiological saline syringe,

the cylinder holding mechanism comprises a pair of mechanism individually sliding the piston members of the contrast media syringe and the physiological saline syringe,

the computer unit individually controls the operations of the pair of piston driving mechanisms,

the main operation panel accepts an input action of various data for normal injection of the contrast media and the physiological saline,

the main display panel displays the various data for normal injection of the contrast media and the physiological saline,

the sub display panel displays various data for test injection of the contrast media, and

the sub operation panel accepts an input action of the various data for test injection of the contrast media.

14. A chemical liquid injector according to claim 13, wherein the contrast media syringe is connected to a blood vessel of the patient through the extension tube,

the computer unit has control data for the piston driving mechanism dedicated to checking of a time period necessary for the contrast media to reach an affected area whose image is taken, the control data being stored as the various data for test injection, and the computer unit controls the operation of the piston driving mechanism in accordance with the control data.

15. A chemical liquid injector according to any one of claims 1 to 14, wherein the main display panel displays a condition screen with its vertical axis representing an injection rate and its horizontal axis representing an injection time of the liquid as the various data for normal injection,

the main operation panel accepts an input action of at least one injection condition comprising an injection rate for each injection time period of the liquid as the various data for normal injection,

the computer unit stores the input injection condition,

the main display panel displays the stored injection condition on the condition screen, and

the computer unit measures at least an elapsed time from the start of injection of the liquid, and controls the operation of the piston driving mechanism in real time in accordance with the elapsed time and the stored injection condition.

16. A chemical liquid injector according to any one of claims 1 to 14, wherein the main display panel displays a condition screen with its vertical axis representing an injection rate and its horizontal axis representing an injection volume of the liquid as the various data for normal injection,

the main operation panel accepts an input action of at least one injection condition comprising an injection rate for each injection volume of the liquid as the various data for normal injection,

the computer unit stores the input injection condition,

the main display panel displays the stored injection condition on the condition screen, and

the computer unit measures at least an injection volume of the liquid from the start of injection, and controls the operation of the piston driving mechanism in real time in accordance with the measured injection volume and the stored injection condition.

17. A chemical liquid injector according to any one of claims 1 to 16, wherein the computer unit stores schematic images of a plurality of body sections of a human body and schematic images of a number of regions to be imaged in relation to each other as the various data for normal injection,

the main display panel displays the schematic images of a plurality of body sections in the shape of a human body,

the main operation panel accepts an input action to select one of the plurality of displayed body sections,

the main display panel displays at least one of the schematic images of the regions to be imaged in association with the selected body section,

the main operation panel accepts an input action to select the displayed region to be imaged, and

the computer unit controls the operation of the piston driving mechanism based on the selected region to be imaged.

18. A chemical liquid injector according to any one of claims 1 to 17, wherein the main operation panel and the main display panel together are a single touch panel for accepting an input action of the various data and displaying output of the data.

19. A chemical liquid injector according to any one of claims 1 to 18, wherein the sub operation panel and the sub display panel together are formed as a single touch panel for accepting an input action of the various data and displaying output of the data.